

SEEING CHANGE:
Techniques of Transition in the Three-Dimensional Space of
Recorded Popular Song

by

MAXWELL CHRISTIAN BORTS ZATARAIN

A THESIS

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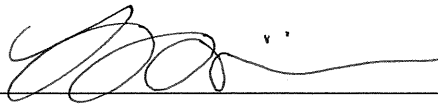
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Loren Kajikawa

This thesis presents a study of the recorded form of popular music through a visual lens. It seeks to show how we conceive of music visually through spatio-visual language such as *high-pitch* and *low-pitch*, and how these spatio-visual conceptual metaphors point towards the recorded form as a spatio-visual space. Second, it seeks to define the parameters of this three-dimensional spatio-visual space through the three axes of height, width, and depth. Third, it seeks to identify and define techniques of transition used by producers and musicians seeking to navigate the moment to moment transitions that give music its vitality.

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Sincerely,

MZ

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List of Accompanying Materials

Spotify Playlist: Tracks 1 – 19

1. “For Once In My Life,” Stevie Wonder (1968)
2. “My Sweet Lord,” George Harrison (1970)
3. “Our House,” Crosby, Stills, Nash and Young (1970)
4. “Chaconne in F Minor,” Pachelbel (ca. 1680)
5. “Brain Stew,” Green Day (1996)
6. “Hello,” Adele (2015)
7. “Build Me Up Buttercup,” the Foundations (1968)
8. “Everyday People,” Sly and the Family Stone (1968)
9. “You Hid,” Toro Y Moi (2010)
10. “Under the Pressure,” The War on Drugs (2014)
11. “Breaking Glass,” David Bowie (1978)
12. “You Ain’t Going Nowhere,” (1968)
13. “Flamingo,” Todd Rundgren (1973)
14. “Zen Archer,” Todd Rundgren (1973)
15. “I Saw The Light,” Todd Rundgren (1971)
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Figure 3. Selenga River Delta, Human Kidney Angiogram, Fractal Image,

Deciduous Tree In Winter

~

Seeing comes before words. The child looks and recognizes before it can speak.

-John Berger, *Ways of Seeing*¹

~

¹ Berger, John. *Ways of Seeing*, 1

Preface: Introducing the Intro and Finding New Transitions

This thesis began as a study of arrangement techniques used in the introductions of late '60s and early '70s Soul records. The more I identified and defined introduction techniques in this genre of music, the more I heard these same techniques in intros across all genres. Not only did I hear these techniques in intros, but I began hearing them throughout songs as techniques of transition from section to section, sound to sound. As I become more acquainted with these concepts, I came to the conclusion that many of these techniques function relative to the unique medium of contemporary popular music, which is to say the mix – the aspect of music that ultimately synthesizes all other aspects into a self-contained product: the record. As I wrote, studied, and listened, I began to hear music in a new way: I began to *see* it. More to the point, when I listened to music, I began to conceptualize it visually as a three-dimensional space defined by the axes of depth, width and height. Using this visual lens, I embarked on a re-examination of these techniques of transition.

This thesis presents an analysis of record production and arrangement through a visual understanding of music and the soundbox of recorded music. It argues that many of the techniques of transition commonly employed in popular music function in ways that can best be described relative to visual, conceptual-metaphoric terms – for example, in the language we use to describe music (e.g. *high* pitch, *low* pitch). I hope this analysis provides insight into the complex processes of craft that go into the creation of popular music, and I hope it inspires noise-makers everywhere to do their thing.

Introduction: Who, Who, What, and Why

By Who

At Montclair Elementary, music class was hands-down my least favorite class. I loathed the days when we had to practice “Hot Cross Buns” or attempt to make a guitar string vibrate. Myself-of-yesteryear would have been much happier playing basketball, which I was sure was going to be my future due to my dead-eye three-point shot. As my peers grew taller and I stayed short, my hoop dreams air-balled into oblivion. Fortunately, in Middle-School, new avenues of self-definition emerged through the pressures of social capital. A friend in class had recently received a guitar for Christmas, and, with it, the gift of *cool*. Like many of my envious peers, I wound up with a guitar in my hands just a few months later...

Thinking back on my dubious and unromantic musical origins, it occurs to me how ironic it is that my life now revolves around the sounds I once derided, and the instrument I so unceremoniously took as my own. Despite my early musical apathy, however, as I reminisce I am struck by the vivid detail of a few select early musical memories... there’s the time I sang the Hukilau beside my first crush, who looked so nice with a flower in her hair... or the time a friend and I blasted the pre-programmed Star Wars theme from a Casio keyboard at full-volume, only to be met with an equally loud consternation... or the time I heard John Lennon’s “Across the Universe,” and felt for the first time the unresolved, yearning, abstraction that is melancholy. I bring these memories up not to indulge in the sentimental, but to illustrate that, in hindsight, I am

not in the slightest surprised that life has led me down the path of music. These memories of music are too vivid, too indescribable to be anything but meaningful, and as I write this as the final step in earning a Degree in Music, I feel it is important for you, the reader, to understand who I am: a musician, once and always.

When I first entered University, I was completely oblivious to the notion that one could study music in school. I knew there were high-school band classes, but I played guitar and the two, in my mind, could not co-exist. It was only when a dorm-mate revealed his aspirations as a Saxophone performance major that I realized that not only can music be studied in school, but that “making it” was not the result of god-given talent, but rather of hard work and dedication. After a year of school, I auditioned into the Studio Guitar program as a student who had never heard of Bach, could not read a note of music, and had no idea what music theory was. All I knew is that I enjoyed playing guitar and writing songs, and that I was, frankly, unable to do anything else.

The feeling I felt after my first music class can be best described as *culture-shock*. After being taught that Parallel Perfect Fifths were to be avoided at all costs, all I could say was *but what about Blitzkrieg Bop?*

This first experience with academic music called to attention a tension that would exist with me through four-years of study. Why was Popular Music not as present as Classical or Jazz? Why during a required year-sequence on Music History was one day spent on Hip-Hop, zero days spent on rock, and zero days spent on Pop? Why couldn't I take lessons in Soul Bass, or Top 40 Vocals? Despite the luxury of studying with many fine teachers, and learning many great things about music, I

remained frustrated by the lack of attention paid to Popular Music in the required music curriculum.

Due to the completion of Gen-Eds prior to college, I was fortunately able to take many elective courses, such as History of Hip-Hop, History of The Woodstock Generation, and a Popular Music Seminar, which showed me that there was in fact a small, but dedicated group of scholars in the UO SOMD that studied and valued Popular Music. Not only did this provide me great joy, it left no doubt in my mind that Popular Music is worthy of the serious rigor paid to Classical and Jazz in music schools – in fact, it was being studied with the same serious rigor, albeit it underrepresented.

To Who

This Thesis is directed towards three people. First, it is directed to the School of Music and Dance as a plea and argument for the inclusion of an expanded Popular Music Program and a re-examination of what courses students are required to take. If, for example, a student is more interested in Popular Music than Classical Music, perhaps they should have the option of satisfying their major requirements by taking courses pertinent to the avenues of music they wish to travel. Second, it is directed towards music scholars as a window in to the study of Popular Music not just as a cultural artifact but as a *craft*. I was fortunate to take a few Popular Musicology courses at music school, and the lectures on musical craft were always profoundly insightful, interesting, and infrequent. Third, this Thesis is written for students like me who are passionate about subjects not normally taught in school. I hope that the information

presented here not only provides insight into the craft of popular music, but also inspires you to believe in yourself and your ability to do it yourself.

What

This paper addresses the craft of record production. In particular, it addresses the way in which producers facilitate the transition from moment to moment, a facility most necessary in the temporal art of music. It argues that these techniques function relative to a visual conception of music as a cube, or soundbox, a conception present in the language we use when discussing sounds (high, low, etc.). The techniques presented here were defined by me, and as such there is no defined language of understanding to draw upon. In that sense, this paper is an attempt to create a language in which we can discuss recorded music.

Why

My personal goals in writing this Thesis are the result of a desire to perform professionally in the arena of Popular Music. Because there are very few texts devoted to the craft of this music, I had to formulate my own methods as a means of understanding. By deconstructing the music and analyzing the techniques used in its construction, I hoped to gain insight into the craft of making it.

To the world large, the study presented here is important in redefining how we analyze musical worth. Often, my peers derided pop-music based on its “simplicity.”

The logic was the same as the logic in this Internet meme comparing Beethoven and Justin Bieber:



Looking at these images, it can be presumed that Beethoven is more complex and sophisticated than Justin Bieber. This comparison, however, is problematic for two reasons. First, it relies on a visual comparison through the lens of music notation. For Beethoven, the notated score was the one of the primary vehicles for disseminating his music (to performers), and as such he would have written relative to this medium. For Bieber, however, the primary means of dissemination is the record, a techno-innovation that did not exist while Beethoven was alive. Because of this, we can't equate the simplicity of Bieber's score with a lack in quality. On the contrary, many of the elements that comprise the craft of Bieber's from, the record, cannot be conveyed

through musical notation (e.g. use of pitch-modulated delay at the end of a vocal phrase, or panning of a hi-hat from left to right). As such, the simplicity of Bieber's score cannot be taken as simplicity of sound.²

Second, while the Beethoven score presents the music for a solo-piano, the Bieber score presents only a vocal transcription, chords, and bass-line. While Beethoven's score presents the piece in its entirety, Bieber's score leaves out all but two of the hundred-plus musical parts, or tracks, used in the creation of his record.

I hope this example illustrates why thinking about Popular Music through analytical lenses traditionally used to understand Classical or Jazz is not only misguided but also unfair. You wouldn't judge a basketball player in the same way you would judge a golfer. If you did, you may find golf superior, because in golf, the goal-of-the-hole is much smaller than the goal-of-the-hole in basketball, and, thus, obviously, more difficult... In the same way, Popular Music cannot be judged relative to the goals of Classical or Jazz, because it has its own very-different goals.

² Simplicity does not equal bad.

Chapter I: Sound Sculptures: Instrumental Accretion and Musical Space

I.i. Intro to Accretion

Of all the techniques of transition identified in this study, Instrumental Accretion is by far the most ubiquitous. Employed in genres as diverse as the disco-funk of Michael Jackson, the heavy-metal of Metallica, and the freak-folk of Animal Collective,³ Instrumental Accretion is a go-to choice of producers, musicians, and songwriters navigating the transition between silence and sound. Instrumental Accretion navigates this transition by gradually increasing, or accreting, the number of musical sound-sources (instruments, voices, etc.) heard in a track. Because it quickly increases the number of sounding instruments/sound-source⁴, it is most commonly used as an introductory technique, and for that reason, in addition to its ubiquity, it makes a good technique to begin with.

Sometimes Instrumental Accretion is applied linearly, with a steady addition of one sound-source at a time, such as in the intro to “Dancing In the Moonlight” by King Harvest. Other times, accretion may add multiple sound-sources at the same time as layered, composite sounds, such as during the intro-to-verse transition in Sly Stone’s “Hot Fun In The Summertime.”

³ See “Billie Jean” Michael Jackson; “One,” Metallica; “Sweet Road,” Animal Collective

⁴ Because many of the sounds found on records are produced non-instrumentally (e.g. a chirping bird sample), I have elected to use the term “sound-source” to signify any sound used during a song, whether it be a guitar, a sample, white noise, or an effect like delay. Despite this however, I have elected to use the term “Instrumental Accretion” over “Sound-Source Accretion” for reasons of prosody and jargon-less, conceptual immediacy.

In the following chapter, I will argue that Instrumental Accretion functions by playing to our metaphoric conceptions of music as a visual space.⁵ I will use musical examples and visual descriptions to show how both Instrumental Accretion (Chapter I), The Soundbox (Chapter II), The Piano Glissando (Chapter III), and Melodic Foreshadowing/Imitation (Chapter IV) function visually through the lens of musical space. Before exploring how these techniques can be explained understood as visual functions, however, let's first listen to "For Once In My Life," by Stevie Wonder (Track 1).⁶

I.ii. Introducing Instrumental Accretion

Aimed at radio airplay, the intro to a three-minute song like "For Once In My Life," needs to both announce itself in an immediately identifiable way and maintain listener interest long-enough for the song to reach the entrance of the lead vocal. In "For Once In My Life," the accretion of instrumental riffs works to hook audiences and maintain listener interest by gradually expanding the number of distinct musical textures and patterns sounding at once. In measure 1, a single guitar strums a 2nd inversion F-major triad over a low-tom and hi-hat backbeat. In measure 2, a second guitar enters, strumming a 1st inversion F-major triad over a backbeat augmented by an additional, slightly-higher-pitched low-tom. As our ear welcomes the end of measure 2,

⁵ Conceptual Metaphors are metaphors in which concepts (such as love) are understood through the mapping of a source domain onto that of a target domain. In the metaphor "love is a journey," for example, attributes of the source domain "journey" are mapped onto the target domain "love." When we say, "our relationship is at a dead-end," we are referring to love in terms of the source domain of journeys, albeit, in this case, a journey that appears to be ending.

⁶"For Once In My Life" Miller, Ron and Orlando Murden. *For Once In My Life*. Stevie Wonder. Motown, Henry Cosby, 1968.

a third guitar enters playing a melody in F major Pentatonic. Like the second guitar before, this third guitar commands listener attention through its temporal novelty as well as its functional novelty as a member of the *melodic layer*.⁷ In measure 6, a drum fill sets up Stevie Wonder's pick-up into the verse on the and-of-four.

I.iii. Musical Motion (Occurs Through Space)

In "Something in the Way She Moves," Mark Johnson and Steve Larson argue that our conceptions of musical motion are defined by "conceptual metaphors ... based on our experience of physical motion."⁸ Because musical motion is conceived of through metaphors of physical motion, and because physical motion occurs in time, in order to understand conceptual metaphors of music, it is necessary to first understand conceptual metaphors of time. When we say "time is *flying by*" or "this week is *going really slow*," we are conceiving of time through a metaphor in which time is a figure "moving relative to the stationary observer."⁹ This metaphor system, which Johnson and Larsen dub the "Moving Times" system, defines and includes statements such as "Thanksgiving is *on it's way*," "the deadline is fast *approaching*," and "New Year's *will be here* before we know it." In each of these examples, time is a figure moving relative to a static observer in a given space.

⁷ Functional Layers of Song are discussed in depth in section I.vii. For now, the *melodic layer* is, intuitively, the melodic aspect of music. The other layers are: the *functional bass* layer, the *explicit beat* layer, and the *harmonic filler* layer. These layers are outlined in *Song Means* by Allen F. Moore. See: Moore, Allan F. *Song Means: Analysing and Interpreting Recorded Popular Song*. Farnham, Surrey: Ashgate, 2012. Print.

⁸ Johnson and Larson, 63, Metaphor and Symbol, 18(2), 2003

⁹ Johnson, and Larson, 68

In addition to the “Moving Times” system, Johnson and Larson define the “Moving Observer/Time’s Landscape” system as another system of temporal conception in which “the observer moves across a landscape and times are points or regions on that landscape.”¹⁰ Examples of this system can be seen in statements such as “we’re *halfway through* November” and “we’ve *reached* the final week of the term.” The “Time’s Landscape” system is distinct from the “Moving Times” system in that in “Time’s Landscape,” the observer is moving *through* a space, while in “Moving Times,” a space is *moving past* the observer. Consider, for example, the difference between saying “we’ve *made to it the end of the day*” and “*man, where has the time gone*”. In the first example, the observer has arrived *at* a destination (“the end of the day”) in “Time’s Landscape,” while in the second, time has moved past, or “gone by,” a stationary observer.

I.iv. Experiencing Physical Motion

Johnson and Larson describe three fundamental ways in which we experience motion: 1) We see objects move, 2) We move our bodies, and 3) We feel our bodies being moved by forces. “These three basic experiences of physical motion give rise, via metaphor, to three of the chief ways we conceptualize musical motion. Moreover, because musical motion, like physical motion, occurs over time, our two different metaphorical conceptualizations of time (“Moving Times” and “Time’s Landscape”)

¹⁰ Johnson and Larson, 67

are incorporated into the basic metaphors of musical motion.”¹¹ Thus, “Moving Times” becomes “Moving Music” (e.g. *here comes the weekend* becomes *here comes the chorus*) and “Time’s Landscape” becomes a “Musical Landscape” (e.g. *we’re coming to the end of an era* becomes *we’re coming to the end of the bridge*). Because we conceptualize musical movement through metaphors of time, and because we conceptualize time through metaphors of physical motion through space, metaphors of musical motion also identify metaphors of musical space.

I.v. Sonic Space/Psychoacoustics

Listen to your environment. Perhaps, you hear the rustle of cottonwoods over the cool Willamette in November. Or, perhaps, you hear the percussive two-step of two-hundred undergrads typing term papers as you step through Knight Library. Regardless, no matter where you are, sound is happening. The unique sounds that make up this sonic tapestry may even include music. Listen again to these environmental sounds with special attention paid to *where* a given sound-source is coming from. Is it coming from behind you or is it in front of you? How far away is it? Is it coming from above or below? Left or right? Is it moving over time? Now listen to the quality of this sound. Is it high or low? Bright or dark? Thick or thin? Breathy or bodied? Do any of these qualities change over time? Answering questions like these reveal the capacities of our brain to perceive and understand acoustic environments. The study of these neuro-processes is called psychoacoustics. Because it informs the way we *hear* space, I will refer discipline over the course of this thesis.

¹¹ Johnson and Larson, 69

I.vi. Musical Space

Let's listen to "For Once In My Life" a second time. As you press play, two things happen. First, like the rustling leaves or tapped keyboards, the sounds of "For Once In My Life" will become a part of the larger sonic environment in which they exist. Second, in addition to becoming *a part* of that environment's sonic identity, "For Once In My Life" will create a sensation of being it's own self-contained sonic environment or space, a space I will refer to hereafter as the *musical space*.

The qualities of this musical space are defined through two levels: the *overall sound* level, and the *individual sound sources* level.¹² The overall sound level is determined by the parameters of the *soundbox*, "a heuristic model of the way sound-source location works in recordings, acting as a virtual spatial 'enclose' for the mapping of sources."¹³ In other words, the soundbox is a conceptual tool from which we can make sense of how a musical space is constructed via relationships between individual sound-sources, time, and the *x*, *y*, and *z*-axes of (*x*) laterality of sound-sources (i.e. left, right, center, etc.),¹⁴ (*y*) perceived frequency characteristics of sound-sources (i.e. high or low pitch, timbre, etc.), and, (*z*) perceived proximity of sound-sources to the listener (i.e. depth, or distance, of a sound-source).¹⁵ Sound-sources have the potential to change along these axes through performance and production.

¹² Moylan, William. "Chapter 11: Considering Space In Recorded Music." Ed. Simon Frith and Simon Zagorski-Thomas. *The Art of Record Production: An Introductory Reader for a New Academic Field*. Burlington, VT: Ashgate, 2012. 163-88. Print.

¹³ Moore, 31.

¹⁴ Note: Laterality does not apply to mono-recordings.

¹⁵ These axes are respectively explored in depth in sections II.ii, II.x, and II.xiv

Individual sound sources are the constituent parts that make up the overall sound level, which is to say that individual sound-sources (instruments, voices, etc.) and their qualities (location, frequency range, reverb-levels, etc.) determine the overall sonic landscape. Just as a human is made up of many individual cells, and a painting is made up of many individual brushstrokes, so the overall sound level is made up of many individual sound-sources.

I.vii. Peeling Back the Layers

In the first four measures of “For Once In My Life,” a sonic space is created relative to the sound-sources present at the start of the track: a guitar, a hi-hat, and a low-tom. Each of these sound-sources is the member of one or more distinct, functional layers. The first layer is the *explicit beat layer*.

The *explicit-beat layer*’s primary function is to articulate an explicit pattern of beats. It’s sound-sources include percussive sound-sources such as congas, guiros, shakers, and chimes, as well as the individual sound-sources that make up the overall sound of a drum set: the snare drum, hi-hats, cymbals (crash, ride, splash, china, etc.) kick-drum(s), a high-low pitch-range of toms, a cowbell, and how ever many other spices a drummer needs to season her beat to taste.¹⁶

The *functional bass layer* has the rhythmic function of contributing to the groove, and the pitch function, in most popular styles, by existing at the bottom of a given overall harmony.

¹⁶ On the spice rack of the drum-kit, the cowbell is unique in it’s ability to cure fevers.

The third layer, the *melodic layer*, functions to make explicit one or more melodies. Of these melodies, some will be secondary and one will be primary. It is this primary line that defines the *tune* and articulates a song's lyrics. Though vocals tend to dominate our attention in this layer, other instruments, such as lead electric guitars and saxophones, often contribute to this layer.

The fourth layer fills the registral space between the bass frequencies of the *functional bass layer* and the treble frequencies of the *melodic layer*. This layer is called the *harmonic filler layer*, and includes any pitched instruments functioning harmonically.

Listening to these four layers, we can hear that the first seconds of "For Once In My Life," articulate the *harmonic filler layer* through the guitar, and a faint *explicit beat layer* through the low-toms. Because the guitar is mixed louder than the hi-hat and low-tom, it occupies the "musical foreground," while the *explicit beat layer* of the hi-hat and low-tom occupy the "musical background." While language of sonic proximity is useful in discussing sounds (nearness/farness, foreground/background, etc.), in reality, no recorded sound is any closer or further than any other recorded sound given that each comes out of the same speakers/headphones. In other words, all the sounds of a record travel to your ear from the same location. Despite this reality, however, we do perceive sounds as having varying degrees of proximity due to differences in volume, differences between reflected/non-reflected sound, and relative degrees of brightness and darkness.

A louder sound is more likely to be perceived as closer, or more "up front," than a quieter sound due to associations between proximity and loudness in our everyday

experience. Because, for example, a ringing phone will sound louder the closer it is to you, we intuit a relationship between proximity and volume.

When Stevie Wonder enters “For Once In My Life” at the end of measure six, his voice is mixed louder than the guitars and thus becomes the new musical foreground. On the downbeat of measure 7, the introduction of the bass-line and a punchier, kick-drum backbeat creates a new “bottom” or “ground” in the mix, which can be visualized as the “height” of the musical space expanding downward. Because Stevie Wonder’s voice enters just prior to this lowering of musical ground, an affect is created in which his voice both leads us into and is emphasized by the entrance of the *functional bass layer*. At the entrance of lyrics, the introduction has concluded and we are in the verse.

I.viii. Function: Instrumental Accretion Is A Bridge Between Spaces

So far in this chapter we have explored metaphors of musical space in two different ways. First, we examined the work of Johnson and Larson who identified our conceptual understanding of music as one primarily founded on motion, space, and motion through space. Second, we looked at Allen Moore’s conception of the musical *soundbox* which defines the parameters of our musical space in terms of 1) time, 2) perceived proximity of sound-sources to the listener (i.e. depth of a sound-source), 3) the perceived frequency characteristics of sound-sources (i.e. high or low, timbre, etc.), and, if mixed in stereo 4) the laterality of sound-sources.

These approaches to musical space are necessary in understanding what I believe to be Instrumental Accretion's primary function as an introductory technique of transition: that of gradually bridging our entrance from the space of the everyday into the realm of the musical.

I. ix. Positive Space, Negative Space

In 1951, the artist Robert Rauschenberg premiered his work "White Painting." The painting (Fig. 1) appears to be three blank canvasses, though each canvas is actually coated in a thin film of white paint. The visual silence of this piece, which would later inspire John Cage's 4'33", asks us to re-examine our definitions of what art *is* and *is not*. Rauschenberg's painting and Cage's composition subvert our expectations that art and music need to be filled with positive visual and musical space, which is to say, that art and music need to be defined by the *presence* of particular sensory stimulus such as paint or percussion. By creating a painting that appears to be "blank," Rauschenberg questions distinctions between presence and absence, and, in particular, the way in which these concepts have informed our definitions of art.

Like “White Painting,” Cage’s 4’33” challenges our notions of what music is by directing our attention to the sounds of the acoustic environments music exists within¹⁷ and asking us if those sounds are music, too.

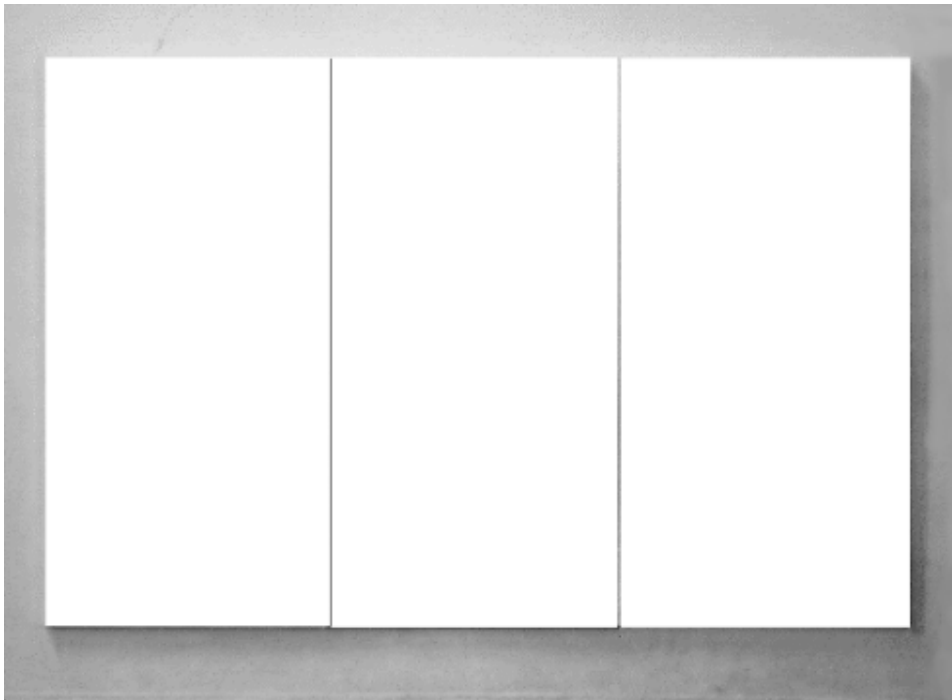


Figure 1. Robert Rauschenberg, "White Painting"

The concepts of positive and negative space explored by Rauschenberg and Cage are useful in understanding the microcosmic space of the musical soundbox. Just as Rauschenberg’s “White Painting” functions through concepts of positive and negative space within a given frame, or canvas, Instrumental Accretion likewise functions in terms of negative and positive sonic spaces. In the canvas of the soundbox, sections filled with sound are analogous to sections of a canvas filled with paint. These

¹⁷ See *environmental space* as discussed in Sections I.v. and I.vi.

sections are the aural equivalent of positive visual spaces, and for that reason I will refer to the presence of sound as *positive sonic space*. Frequency ranges devoid of sound, the aural equivalents of Rauschenberg's "White Painting" and other "blank" canvasses can be conceived as *negative sonic space*.

In art theory, *positive* and *negative space* are commonly misidentified as the respective presence and absence of a stimulus, such as paint. By definition, however, *positive space* is that which is in the foreground, and *negative space* is that in the background. For our purposes, the definition of *positive musical space* as the presence of musical sound and *negative musical space* as the absence of musical sound holds up given that, in active listening, *positive musical sound* is fore-grounded relative to the environmental sounds that comprise the sonic background and *negative musical space*.

I.x. Musical Space, Non-Musical Space

Because we are defining the *Musical Space* as the space created by a sounding-record, a space distinguished from the *Non-Musical Space* that comprises the sounds of an environment, the *Musical Space* exists only when actively listening to music. Otherwise it becomes a stroke on the overall acoustic canvas of a given sonic environment.

Instrumental Accretion functions relative to the Musical Space by replacing negative sonic space with positive sonic space. In "For Once In My Life," this manifests as an ordered, one-at-a-time layering of sound-sources. While this is a common

implementation of Instrumental Accretion, it is not the only way the technique is used, as some songs may accrete multiple sound-sources simultaneously.

I.xi. Instrumentation Expansion and Instrumental Accretion

Instrumentation refers to the art of choosing which sound-sources to create sound with and how to arrange that particular set of sound-sources within a given musical section. If we heard a version of “For Once In My Life” that began with mandolins and taiko drums instead of guitars and low-toms, we could say that the *instrumentation* would have changed from guitars and low-toms to mandolins and taiko drums. Because it involves the addition of sound-sources, Instrumental Accretion is really a specific means, or technique of instrumentation. A similar technique, *Instrumentation Expansion*, functions by expanding the sound-source palette without necessarily increasing the number of sounding sound-sources from moment to moment. Instrumentation Expansion refers not to the layering of parts and brushstrokes, but rather to painting with new colors and sound-sources.¹⁸ If, for example, a song began with a four-piece string section, and then transitioned to a section of just solo guitar, we could say that the this transition was achieved through Instrumentation Expansion, not Instrumental Accretion, because though the number of sound-sources sounding simultaneously did not increase (from *four* violins to *one* guitar), the number of sound-sources heard in the track at large has increased (from *four* sound-sources to *five* sound-

¹⁸ If a guitar comes plays C4, it will fill a different sonic space than a violin also playing C4 due to differences in each instruments resonant capacities and overtones, the factors that determine an instrument’s timbre, or color. This will be discussed in depth in section II.ii.

sources). To illustrate this technique in actions, let's listen to "My Sweet Lord" by George Harrison.

Lxii. Instrumentation Expansion in "My Sweet Lord"

"My Sweet Lord,"¹⁹ (Track 2) begins with a bed of similarly strummed acoustic guitars. At the beginning of measure 9, a new strummed guitar sound comes in that sustains longer than the previously strummed guitars. Because of this durational, or rhythmic, novelty, this guitar is accented and emphasized. Additionally, this sound is augmented by a reverb-soaked pad tone that exists behind the new-strummed guitar, creating a perception of timbral mixing. Just as blue and yellow mix to make green, two sound-sources can be mixed together to create a new, composite timbre.

Immediately following this, a lead slide-guitar enters. Here, too, a new timbre expands the *positive sonic space* of the soundbox. George Harrison's vocals enter in measure 16, following the exit of the lead-slide guitar. While the number of sound-sources present at this point does not change with Harrison's vocal entrance due to the silencing of the lead-slide, the number of total sound-sources heard in the track at large does increase, indicating Instrumentation Expansion. Soon, back-up vocals further fill sonic space, followed by a staggered entrance of drums, bass, and tambourine leading into the chorus. Each of these sound-sources occupies a different position in the soundbox, and each expands the *positive musical space* through the distinct, vertical placement of their particular timbres.

¹⁹ (Writer) George Harrison. *My Sweet Lord*. (Artist) George Harrison. (Producers) Harrison, George, Phil Spector. Apple, 1970. Vinyl recording.

Harrison uses Instrumentation Expansion to create a tension that resolves with each chorus. This tension is created through a contrast in space between the lead-guitar of the intro and the lead-vocal of the verse. The final statement²⁰ of the lead-guitar's initial seven-measure phrase begins on the downbeat of measure 7. Because the strummed-guitar intro lasts 8 measures prior to the introduction of the lead guitar, an expectation is created that sections will move in 8 bar groupings. Because the lead guitar's phrase-length lasts 7 measures, with vocals coming in on the eighth measure, our expectations of eight bar phrases are subverted, creating a tension that propels the song forward.

Additionally, the phrasing of the verse vocal melody leaves a significant space equivalent in length to the length of the final statement of the lead-guitar's phrase. Because we have just heard, and been "hooked" by the lead-guitar's final statement, there is anticipation that this space will be filled going forward. When it is not filled, tension is again created, propelling us forward.^{21, 22} By the time we reach the chorus,

²⁰ In classical music pedagogy, sentence structure is described as phrasing form where the length of $y = 2x$. A traditional sentence structure will be xy with y sometimes being comprised of its own subdivisions equivalent to the length of x . This is the case in "My Sweet Lord," where my use of the "final statement" refers to the second half of the y phrase in an xy sentence structure.

²¹ Notably, the strummed-acoustic re-articulates the rhythm of the lead guitar's final statement. In doing so, it hints at the lead-guitar's final statement and foreshadows resolution by giving us a brief taste of release. Despite this, the strummed rhythm does not satisfy our expectation of positively filling space for two reasons: first, it exists as part of the *harmonic-filler layer*, which means it exists in background of the mix. Second, because it exists in the background of the mix, it does not command our attention in the way a fore-grounded sound-source does, and as such does not feel particularly resolute, punctuated, or resolved. The strummed-acoustics' placement in the *harmonic-filler layer* is a result both of mixing and timbre. Simply put, a single-note melodic guitar with distortion will be much more likely to cut through other sound-sources than a strummed-acoustic guitar. Distorted sounds appear more present than undistorted sounds because they evoke the strained, distorted sound of a human voice screaming. Contrast the sound of a single scream against a sea of mumbles, and it's easy to hear which sound is more present (see footnote below). In this case, the fact that the distorted guitar is mixed louder than the strummed-acoustic means that the strummed-acoustic serves a different function than the distorted guitar; because it functions in the *harmonic-filler layer*, the strummed-acoustic cannot function in place of the *melodic layer* lead-slide guitar.

this space is finally filled by back-up vocals, creating a sense of arrival. The presence of the back-up vocals in this space releases the tension created by the subverted expectation of not filling this space, which, simply put, releases elation. Harrison uses positive and negative musical space to create a tension that is heightened through the introduction of new sound-sources via the Instrumentation Expansion technique. A similar technique can be heard in “Hello, Gooby,” by The Beatles.

²² The embodied meaning of distortion is discussed in Simon Zagorski-Thomas’ *The Musicology of Record Production* when he states “staging a guitar sound by adding overdrive or distortion creates a spectromorphology for that sound that is similar to the timbre of a shouting voice. By adding a certain pattern of harmonic and non-harmonic overtones, the staging conveys meaning through relating the guitar sound to the type of emotional human states that we associate with shouting voices,” (83). Zagorski-Thomas, Simon. *The Musicology of Record Production*. Print.

Chapter Two:
Turn and Face the Strange Changes: The Parameters of the Soundbox and Effects
as Sound-Sources

II.i. Time and Movement Through Three-Dimensions

Because music exists in time, the analogy of musical space as a canvas only partly paints the picture of what happens when we listen to music. In the four-dimensional painting of the sound-box, brushstrokes appear, change, disappear, reappear, and move liberally, creating a living, breathing wall of sound-sources. This chapter will attempt to articulate how temporal changes along the *x*, *y*, and *z*-axes of width, height, and depth function in the navigation of musical transitions. Before exploring how changes along these axes function, however, let's first revisit the three axes of the soundbox in earnest.

II.ii. Y-Axis: Height (Pitch/Frequency)

Imagine you are walking along a manicured lawn with your eyes closed. A ground-sprinkler system sputters as it sprays the grass and sidewalk, while a crow caws from the branches of a nearby maple tree. Through a complex process of psychoacoustic recognition, we are able to spatially identify that the sprinkler sputters *below* us, while the crow caws *above* us. In music, we likewise describe pitches through

the vertical language of *high* or *low*. Unlike the sprinkler-crow example, however, in recorded music, these musical pitches will always be coming from the same vertical point of speakers/headphones. In other words, every musical sound we hear in a recording is coming from the same height as the speakers from which they emanate, regardless of how high or low we perceive these sounds to be. Likewise, consider the singer warming up from the *bottom* to *top* of their range during a sound-check on stage. Though we may perceive their singing to be getting higher, in reality, the vocal cords of the singer occupy the same point on the vertical-axis throughout the entirety of their vocal range.

I believe that our use of vertical, spatial language (e.g *high* voice, *low* voice) to describe pitches is a conceptual metaphor based on embodied meaning. Specifically, I propose that we conceive of high and low pitches relative to the way our bodies resonate when we sing different pitches. To illustrate this, sing a note low in your vocal range. You should feel this pitch resonating somewhere in your chest. Now sing a note high in your range. This pitch should feel as if it is resonating somewhere in your head. Intuitively, the lower, heavier tone resonating in your chest is described by vocal pedagogues as *chest voice*, while the higher, lighter tone resonating in your head is described as *head voice*. Though the vocal cords produce pitches from the same location, changes in bodily resonance during phonation of chest and head voices create the perception of a vertical, bodily axis that traces our spine. As resonance moves upwards along this vertical axis, we begin to perceive the pitches causing these resonances as higher. Because the vocal sound-source is the most immediate instrument and, plausibly, the first instrument through which we created music, I believe that our

embodied sensation of vertical resonance has informed the way we understand and conceive of pitches. This is to say that we conceive of pitches along a high-low vertical axis. Because we conceive of pitches this way, when we listen to a record through a pair of headphones, we are able to conceptualize high and low pitches relative to how given frequencies would resonate based on our own bodily experience of vertical resonance.

II.iii. Transitional Functions of the Height (y) Axis.

Though the vertical, pitched aspect of music may appear obvious, it is worth listening to a few examples to showcase how the vertical axis of the sound-box can serve as a means of transition between sections. To do so, let's get down with the bass and cue up a few examples of vertical function in the low end.

II.iv. Vertical Bass Function in "Our House"

Listen to the intro of "Our House"²³ (Track 3) by Crosby, Stills, Nash, and Young. Following eight-bars of a pseudo-Vocal-Pick Up,²⁴ Instrumental Accretion is used to add drums and an audible piano²⁵ at the start of measure nine. Notice that the piano bass-line descends for a majority of its melodic arc. In measure 16, the bass-guitar

²³ Nash, Graham. *Our House*. CSN&Y. Atlantic. 1970.

²⁴ See Chapter X. The Vocal Pick-Up is pseudo, because, although on first listen it may appear to be just vocals, there is actually a piano mixed behind the vocals very quietly in the right channel. Functionally, however, it is for all intents and purposes a Vocal-Pick-Up through the vocal intimacy it creates.

²⁵ There is a near inaudible piano prior to this.

enters and imitates the descending gesture of the piano bass-line.²⁶ This stepwise, descending bass-line is a common technique that has been used from musicians as far back as Pachelbel in the 1680s²⁷ and Adele last month.²⁸ In addition to functioning harmonically with the chords of the song, the descending bass-line in “Our House” serves two additional functions.

First, it expands the musical space downwards. With each descending step of the bassline, the floor of the musical space is lowered, creating an expanded sonic space.

Second, the descending bass-line lends the song an air of emotional melancholy. As evidenced in phrases such as “he *fell* into a depression,” “she’s a *downer*,” and “I’ve hit rock *bottom*,” we associate descent with feelings of sadness and melancholy.

Because it uses a descending bass-line, as opposed to a zig-zagging root movement bassline, “Our House” takes on an air of melancholy that adds depth to the seeming positivity of the lyrics.²⁹ With a chorus proclaiming “Our house is a very, very, very fine house/ with two cats in the yard/ life used to be so hard/ now everything is easy ‘cause of you,” one might get the impression that this is an upbeat, happy song. By placing it in a musical setting typically associated with sadness, however, the band adds depth and complexity to what could otherwise be a simple emotion. The contrasting moods of the lyrics and music raise a number of questions that give the song interest: What happened to the couple’s relationship? Do they still live together? Is this song a tribute to good times-passed?

²⁶ This is an example of melodic imitation among instruments, a technique discussed in depth in Chapter Y.

²⁷ Pachelbel, Johann “Dido’s Lament” (ca. 1680) (Track 4)

²⁸ Adkins, Adele, Greg Kurstin. *Hello*. Adele. Kurstin, Greg. XL, 2015. (Track 6)

²⁹ Lyrics in Appendix A.

The descending gesture of the bass-line, and its significance to the emotional affect³⁰ of the record, is reinforced at the conclusion of the song when the vocals resolve with a descending, stepwise phrase.

II.v. Vertical Bass Function in “Build Me Up Buttercup”

Listen to the beginning of “Build Me Up Buttercup”³¹ (Track 7) by The Foundations. Notice that the bass-line begins with a significant melodic drop downwards, followed by a *climb* back *up* to the initial bass pitch. This example illustrates how ascending bass-motion functions to both text paint and create a sense of arrival at the chorus. This bass-line evokes the chorus lyrics of “Why do you build me up buttercup, just to let me down?” The sudden drop of pitch at the start of the bass-line evokes the “let down,” while the ascending motion of the rest of the bass-line evokes the “build up.” Melodically, the largest changes in pitch occur immediately following and immediately preceding the first pitch of the bass-line. This vertical shape emphasizes this pitch as important, both thematically and functionally.

Functionally, the emphasis of this note works to define the modality of the song as existing in the key of this particular bass note. This means that this note feels stable and like home. If the song was to end on this pitch, it would feel resolved. The emphasis of this pitch takes on thematic significance when contrasted with the rest of the bass-

³⁰ Affect here is used as a noun and is defined as an “emotion or desire, especially an influencing behavior or action.” In this sense, the *affect* describes the emotional state of the song, an emotional state that in turn *affects* (verb) listeners into feeling certain emotional *effects* (e.g. the *affect* (noun) of the descending bass-line effectively *affected* (verb) the listener’s mood through the emotions it connoted. The emotional *effect* (noun) the listener experienced was melancholy.). I will use *affect*, the noun, frequently throughout this paper as *affect* is one of the primary goals of craft across all art-forms.

³¹ D’Abo, Mike, Tony Macaulay. *Build Me Up Buttercup*. The Foundations. Pye. 1968.

line. Because this pitch is emphasized as a point of resolution, we can understand every other pitch as either movement toward or from this tonic, home-base pitch. When the bass-line immediately leaps downwards from this note, it creates a movement away from home that is immediately followed by a build-up back up to this note. In other words, the leap down creates tension that is built up and resolved following the ascending gesture back to the tonic.

Thematically, this note is symbolic of the singer's desires. He desires to be with buttercup, but finds that his lover builds him up only to let him down, beginning the cycle anew. He lets his lover "build him up" because he desires to be on his lover's level (the level of resolution, of home). The bass-line loops by ending on a dominant (*sol*) that resolves back up to the tonic (*do*). This creates a sense of relief and arrival, though this is short-lived as the bass-line quickly drops down on the following pitch. Notably, at 0:31, bass-line moves to a descending, stepwise pattern similar to the one in "Our House" evoking the melancholy of the singer's frustration.

Near the end of the song, the key modulates upwards and a new, higher bass-note takes becomes tonic. This provides a conclusion to the struggle of the singer, indicating that he has at last ascended to the level of his buttercup, only this time they have ascended to an even higher place, together.

II.vi. Vertical Bass Function in “Everyday People”

Listen to Sly and The Family Stone’s “Everyday People,”³² (Track 8). Unlike the previous two examples, this bass-line remains on one pitch throughout the entire song. As with “Build Me Up Buttercup,” this functions musically, by establishing a key-center, and lyrically, through conceptual text-painting. In arranging a flat, level ground at the bottom of his mix through a pitch-static bass-line, Sly visually evokes the common-ground message of his lyrics. Through this level playing field bass-line, Sly musically illustrates that we – all people – are on equal ground as human beings.

II.vii. Frequency, the Other Side of the Y-Axis

So far, our exploration of the Y-axis has focused on bass-lines and pitch. It is important to note that the concepts discussed in the previous three sections are used across all sound-sources and layers in addition to bass-lines and the *functional bass layer*. Additionally, it is important to acknowledge that the placement of a sound-source along the vertical axis is not solely a result of pitch, but also one of frequency.³³

If we were to build a timbre from scratch, as one might with a synthesizer, we could generate a sine-wave that consists of a single sound-wave moving at a frequency of 440hz. Based on contemporary tuning standards, we could describe this sound as an A4.

³² Stone, Sly. *Everyday People*. Sly and the Family Stone. Stone, Sly. Epic. 1968

³³ Frequency refers to the physical rate of motion (cycles per second) of a given sound, while pitch refers to a psychological perception of that movement. Due to the complex range of overtones (i.e. frequencies) present in most sound-sources, pitch perception is a process of synthesis. Unfortunately, it is one we do not well understand.

Unlike a sine-wave, however, all acoustic and most electric sound-sources resonate at more than a single frequency. Instead, most sound-sources resonate at multiple frequencies stemming from a *fundamental frequency* (the frequency that in isolation becomes a pure-tone) based on the materials they were made with, their shape, their size, and the way in which they were *attacked*.³⁴

Due to differences in timbre, a violin and a guitar can both play the same note but sound completely different and unique. If we played an A4 on guitar, we would hear a *fundamental frequency* created by a string vibrating back and forth 440 times per second. In addition to that *fundamental frequency*, however, we would hear many other frequencies, or *overtones*, layered above this *fundamental frequency* as a result of the guitar's unique resonance properties. Comparatively, a violin's overtone thumbprint differs significantly. It is the unique resonance properties of each sound-source, and, subsequently, the unique overtone make-up of each sound-source, that gives each its unique timbre.

Despite the guitar sounding many other frequencies, we will still perceive this pitch to be the *fundamental frequency* A4 for reasons not fully understood. For our purposes, it is sufficient to understand that different sound-sources will occupy different places along the *y-axis*, even if they are all sounding A4: This is because they are each resonating and sounding at unique, timbre-defining *overtones* in addition to the resonating and sounding the fundamental frequency of A4.

³⁴ Attack refers the way in which the sound is produced. Attacks can range from soft to hard, breathy or glottal, strummed or plucked, etc.

II.viii. Equalization (EQ)

If you've ever listened to the radio in a car, you've probably adjusted the sound through equalization. Maybe you turned the bass up so that you could feel it in your chest. Or, maybe, you boosted the treble so you could hear the vocals over the low-rumble of your engine. Though you were not adjusting the pitches being played, you *were* adjusting sound-sources along the y-axis by adjusting, or equalizing, the volume of particular frequencies.

Equalization, or EQ, is a tool used by producers and musicians to finely sculpt overtones. Though EQ cannot change the pitches being played by a musician, EQ can adjust the way an instrument sounds when playing a given pitch. Just as a guitar and a violin sound different because of differing overtones, EQ works to alter a sound-source's timbres by re(de)fining the valleys and peaks of a given sound-source's overtones.

EQs work by boosting or cutting particular frequencies within particular frequencies ranges. Depending on one's equipment, one will have more or less refined control of which frequencies are altered. In a minimal car stereo EQ, one might be able to alter two broad ranges of frequencies, marked "treble" and "bass." Professional EQs, on the other hand, might enable you to adjust ten separate frequency ranges with the ability to control the width of these ranges. To hear how equalization can be used as a technique of transition, let's listen to a musical example.

II.ix. Equalization/Filtering in “You Hid”

Cue up “You Hid”³⁵ (Track 9) by Toro y Moi and pay special attention to the timbre of the drum-set sound-source. Notice how over time the drums become more present, or more up front (*z*-axis), in the mix. This change in presence-over-time is the result of a timbral modulation through the use of a filter. Like a coffee filter, a musical filter works by allowing certain frequencies to “pass through” and be heard, or digested, while other frequencies are not allowed to pass through and are thus not heard. Because filters boost or cut particular frequencies, a filter is a form of equalization.

In “You Hid,” the drums run through a *low-pass filter* which means that low frequencies are “allowed” to be heard, while high frequencies are not. Over time, this filter gradually opens, allowing more and more high-frequencies (i.e. more overtones) to be heard, resulting in a significant timbral modulation. In “You Hid,” the dynamic use of a filter creates a drum-sound that goes from sounding muffled to sounding fully present by the time the verse drops at 0:42. The “arrival” of the drums as a present-sound function to build momentum into the verse and the entrance of the vocals.

The Looking Glass uses a similar dark-to-bright timbral modulation through filtering on the drums during the intro to “Brandi.” While more subtle than “You Hid,” the intro drum-sounds of “Brandi” become brighter, crisper, and more present over the song’s initial seven seconds, leading into a drum-roll and drop of the verse. In both songs, a timbral modulation is used to build tension and momentum into the entrance of vocals at the start of the verse.

³⁵ Bundick, Chazwick. *You Hid*. Toro Y Moi. Bundick, Chazwick. Carpark Records. 2010.

II.x. Width (Left-Right Laterality)

In addition to y-axis of height, the musical sound-box is also defined along a horizontal left-right axis. In stereo recordings, the range of this axis is analogous to the horizontal line between the speakers/headphones the music billows out of. In most mixes, sounds are mixed along all ranges of this spectrum, meaning that we perceive sounds to exist to our left, our right, and straight ahead or centered. Like pitch, this center placement is a psychoacoustic perception and not a physical reality. This placement is the result of a sound having equal placement in both the left and right speakers. It is perceived as the sounds of a person speaking directly in front of us: because the sound reaches each ear at the same time, we perceive it as existing in between both ears. If you are listening to headphones, and you perceive a sound as being center-mixed, you perceive it as so because you are getting an equal mix of that sound in both left and right channels, not because the sound is coming from inside your skull. To illustrate the horizontal *x*-axis of the soundbox, let's listen to a few examples.

II.xi. Width in “Under the Pressure”

Listen to the opening seconds of “Under the Pressure”³⁶ (Track 10) by The War On Drugs. Notice how the sound expands out from the center to fill the space in the left and right channels. The War On Drugs achieve this effect through the use of a sound-source panned center, and two delays respectively panned left and right. The initial

³⁶ Granduciel, Adam. *Under the Pressure*. The War on Drugs. Granduciel, Adam. Secretly Canadian. 2014.

sound-source creates a percussive tick placed at center. This *tick* is then delayed by two delays set at separate rates, or tempos. These delays are respectively panned left and right. As time progresses, these delays trigger further delays that repeat the initial *tick* at an exponential rate. This use of panned delays function to expand and define the laterality of the soundbox.

II.xii. Width in “Breaking Glass”

David Bowie’s “Breaking Glass”³⁷ (Track 11) utilizes width to evoke the words “listen” and “see.” At 0:32, Bowie calls out “listen,” to which a synthesizer responds by playing three consecutive notes that respectively panned hard right, center, and hard left. When Bowie uses this same effect following the word “see” at 0:52, we can presume that Bowie understands the spatio-visual aspect of record production.

II.xiii. Width in “You Ain’t Going Nowhere”

Listen to the first seconds of “You Ain’t Going Nowhere”³⁸ (Track 12) as performed by The Byrds. In your left channel, you will hear a slide-guitar. In the right channel you will hear reverberations of that slide guitar. This is a common effect in which a dry, or un-effected sound-source is placed in one channel, while a wet, or

³⁷ Bowie, David, George Murray, Davis, Dennis. *Breaking Glass*. David Bowie. Visconti, Tony. RCA. 1978

³⁸ Dylan, Bob. *You Ain’t Going Nowhere*. The Byrds. Usher, Gary. Columbia. 1968

effected sound-source, is placed in the other. In this case, the dry slide-guitar exists in the left-channel, while the wet, reverberations are panned to the right. This creates the sensation of hearing the slide-guitar in a large room or hall. In real life, when we hear a sound-source in a room, we hear a combination of both the original sound-source and reflections of that sound-source bouncing off the walls. This physical phenomena is recreated in “You Ain’t Going Nowhere” through the use of studio reverb and panning. Through panning and reverb, Gary Usher’s production creates a sensation of a physical space complete with height, width, and depth.

II.xiv. Depth (Distance/Dynamic)

In addition to the y and x -axes of height and width, the soundbox is defined by the z -axis of depth. This axis is based on our perception of how far away a sound source is. Like pitch, or the center pan, depth in the soundbox plays to perception rather than reality given that all sounds emanate from the same depth as the speakers or headphones producing them. We have already discussed how sounds may be fore or back-grounded based on their relative volume (see I.vii) and the way they are mixed with effects such as reverb (see above, II.xiii). In the intro “For Once In My Life,” for example, the low-toms are perceived as being behind the guitars because they are mixed quieter and because they are masked by more reverb. This functions on the basis of our physical experience of sound within a contained space. Imagine, for example, having two conversations in a large hall. The first conversation is with a person arm’s reach away. The second is with a person at the opposite end of the hall. In the first conversation, you

are likely to hear much more of the un-reflected, or un-reverberated sound. In other words, you will get more of the original sound, which indicates that that sound-source is nearby. In the second conversation, you will hear a greater mix of reflected and un-reflected signals because the sound has had more time to reflect off the walls and mix with the original, un-reflected sound before reaching your ears. Generally, sounds soaked in reverb tend to be perceived as existing further away than dry, un-reverberated sounds.

II.xv. Depth in “Flamingo” and “Zen Archer.”

Todd Rundgren text-paints a portrait of death and time through his use of volume and depth in *A Wizard A True Star*’s “Flamingo”³⁹ (Track 13) and “Zen Archer,”⁴⁰ (Track 14). “Flamingo” concludes with the entrance of sound-sources that evoke a flying arrow, followed by a sound-source that evokes a meaty object (i.e. the bird) falling out of the sky. The death of this bird is re-imagined lyrically in “Zen Archer,”⁴¹ which text-paints the scene at 3:16 through modulations of the depth-axis via decibel modulation and dynamic-equalization. At 3:16, a saxophone enters representing the bird, followed by a guitar representing the dark thing in the shadows (death, the grim reaper). This dark thing gradually overpowers the bird as the bird is simultaneously made smaller through a fade-out in volume and an EQ that cuts its low end, making room for the “dark thing” (the guitar) to fill the opened space formerly

³⁹ Rundgren, Todd. *Flamingo*. Todd Rundgren. Rundgren, Todd. Bearsville. 1973

⁴⁰ Rundgren, Todd. *Zen Archer*. Todd Rundgren. Rundgren, Todd. Bearsville. 1973

⁴¹ Lyrics in Appendix B.

occupied by this low-end. This process repeats again with the dark thing being replaced by a snare drum (time). Here, the percussive, march-like drums represent time and illustrate that time is the ultimate equalizer as it overpowers both the bird and the dark thing, occupying the spaces in the mix they once filled.

Chapter III:

Pull Me In: Piano Glissandos

III.i. Defining Glissando

*Glissando*⁴² is a term used to describe a continuous upward or downward slide between two notes. Instruments capable of true *legato*,⁴³ such as Theremins, voices, and violins are able to create smooth glissandos through their ability to fluidly connect notes. For percussive instruments, like guitars, pianos, and marimbas, glissandos are executed through rapidly *attacking* a series of notes. When done quickly, this can create the illusion of connected legato. To hear this, try running your ID card along a zipper or spiral notebook. Do you hear this as a sustained sound, or as a series of attacks? What happens if you change the speed of motion?

III.ii. Piano Glissandos Most Commonly Descend

As a technique of transition, glissandos in popular music are most commonly played on pianos and are most commonly used in introductions. Like strumming the strings of a harp, piano glissandos create a shimmering, sparkling sound due to the rapid

⁴² *Glissando* is the etymological descendant of *glisser* (French, “to slip, slide”) and *glissare* (Italian, “to skate, gloss over”).

⁴³ *Legato* sounds flow together, *staccato* sounds pop ‘n’ snap.

sounding of multiple notes in succession. The vast majority of piano glissandos descend, which creates a sensation of “landing” in the groove.⁴⁴

The prevalence of descending piano glissando intros can be explained by the particular frequency sensitivity of our ears. Because our ears are most discerning of high frequencies,⁴⁵ the high frequencies at the beginning of a piano glissando are more likely to cut through the sonic frequencies of a given environment than they would if they started in the lower-range of our hearing. This is important given that music is often heard in environments, such as clubs and cars, which include considerable background noise. Starting with high frequencies enables the glissando to cut through background noise, earning the attention of listeners and guiding them down into the groove.

III.iii. The Visual Function of Piano Glissandos

Visually, descending pianos glissandos function by outlining the upper and middle ranges of the y-axis. Because descending piano glissandos efficiently traverse a large range of the y-axis in a short period of time, they are particularly effective at conveying the vertical space of the soundbox. As a spacial-expander, Piano Glissandos function similarly to the previously explored techniques of Instrumental Accretion and Width Expansion which also work to expand the positive sonic space of the soundbox.

⁴⁴ For an example of an *ascending* piano glissando, see “Race For The Prize” by the Flaming Lips.

⁴⁵ To hear this, play a cluster of notes at the low-end of a piano and again at the high-end. The high-end notes will be articulate, while the low-end notes will be muddy. If you don’t have a piano handy, there are many online music sites such as virtualpiano.net that you can use to try this out.

Piano Glissandos achieve an articulation of sonic space by directing, or pulling, listener attention downwards. This is analogous to the concept of *lines* in visual art. In the composition of visual art, *lines* are an optic phenomena that directs the movement of the eye through a given work. This technique is present in the flag-pole of Joe Rosenthal's famous photograph "Raising the Flag Above Iwo Jima," (Figure 2). Notice how our eyes trace and follow the line made by the flag poll. Compositionally, Rosenthal uses the line of the flag-poll to call viewer attention to both the flag and the soldiers raising it. Like the flag-pole, Piano Glissandos in a musical mix create a "line" that directs the ear towards the entrance of new sound-sources.⁴⁶



Figure 2. Rosenthal, Joe. "Raising the Flag Above Iwo Jima"

⁴⁶ Note that the introduction of new sound-sources following a Piano Glissando is consistently achieved through Instrumental Accretion.

III.iv. Tonal Function of Piano Glissandos

In addition to their ability to cut through, piano glissandos are capable of defining tonalities, or keys. In David Bowie's "Young Americans," (1975) the intro piano glissando descends from G to G. With a verse in the key of C, this G to G piano glissando can be thought of as a Dominant Pick-Up⁴⁷ of sorts. This means that it pulls towards the "home" key of C. In The Jackson Five's "I Want You Back," (1969) the piano glissando begins on a C and appears to end on an Ab. Though the glissando actually ends on A, the immediate tonicization of Ab following the piano glissando creates a perception that the piano glissando lands on Ab. While "Young Americans," uses a piano glissando to define the dominant harmony resolving to tonic, which creates tension, "I Want You Back," begins on the major third and ends on the tonic, resulting in a happy, upbeat feel.

III.vi. Sample Songs that Utilize Piano Glissando Intros

- "I Want You Back," The Jackson Five (1969)

- "Charity Ball," Fanny (1971)

- "Bang A Gong (Get It On)" T. Rex (1971)

- "Young Americans," David Bowie (1975)

- "Dancing Queen" Abba (1976)

⁴⁷ Dominant 7th Chords create tension and resolution due to the presence of a "Tritone" interval, an interval known as the Devil's interval in the Middle Ages. To hear this, play B and F (tritone). These notes "want" to resolve inward to C and E (major 3rd, Major Key) or C and Eb (minor 3rd, Minor Key).

- “Come on Eileen,” Dexy’s Midnight Runner (1982)
- “The Opposite of Afternoon,” Unknown Mortal Orchestra (2012)

III.vii. Piano Glissandos Outside of Intros

So far, our exploration of piano glissandos has focused on intros. Though piano glissandos are most commonly used in introductions, they are also frequently used as techniques of transition between sections of a song.

Songs that use Piano Glissandos as non-intro transitions:

- “Kodachrome,” Paul Simon⁴⁸ (1973)
- “Charity Ball,” Fanny⁴⁹ (1971)
- “Good Vibrations,” Marky Mark and the Funky Bunch (1991)⁵⁰

⁴⁸ “Kodachrome” uses three separate Piano Glissandos at 0:56, 1:57, and 2:58.

⁴⁹ In addition to using a Piano Glissando in its intro, “Charity Ball” uses a Piano Glissando during its outro.

⁵⁰ “Good Vibrations” uses four consecutive Piano Glissandos at 3:20 to transition into a Piano Solo. It uses four consecutive *ascending* Piano Glissandos at 3:50 to transition into a repeat of the Chorus.

Chapter IV:

Say It (Over and Over Again): Melodic Foreshadowing/Imitation (MFI) and Phrase-‘n’ -Paste (PnP)

IV.i. The Familiarity Principle

Just as alliteration pleases the ear through the repetition of similar sounds, Melodic Foreshadowing pleases the ear through the repetition of similar melodies. This pleasure is founded on the psychological phenomenon known as the *familiarity principle*.

In 1968, Robert Zajonc ran an experiment in which participants were shown pseudo-Mandarin characters a varying number of times before being asked to rate each character on a scale of bad to good. Zajonc hypothesized that the “mere exposure of [an] individual to a stimulus object [would] enhance [their] attitude to it.”⁵¹ The results confirmed his hypothesis: on average, participants rated symbols “good” the more they were exposed to that symbol. This effect, dubbed the *mere-exposure-effect*, and, later, the *familiarity principle*, posits that we enjoy a stimulus the more we are exposed to, and familiar with it. The familiarity principle is at the heart of many human phenomena ranging from advertising to interpersonal attraction to the enjoyment of well-tread books. The familiarity principle may in even in part explain the ecstasy of repetitive

⁵¹ Zajonc, Robert. Journal of Personality and Social Psychology. Volume 9, No.2. June 1968.

rhythms, chord changes, and formal sections that comprise what may be the most repetitive of human art forms: music.⁵²

In arrangement and performance, musicians and producers often play to the familiarity principle as a means of enhancing the enjoyment and memory of melodies through Melodic Foreshadowing. In Melodic Foreshadowing, melodies are repeated, with varying degrees of exactness, prior to the entrance of lead vocals. In doing so, an effect is created in which the lead vocal feels familiar, which not only enhances our enjoyment of the melody but also endears us to the vocalist. Because vocals are the most direct vehicle for driving home a song's message, it is important that listeners immediately connect, believe, and sympathize with a song's vocalist. While this is in large part determined by songwriting and performance, arrangement techniques like Melodic Foreshadowing can catalyze this process of vocal connection.

IV.ii. Songs that Utilize "Melodic Foreshadowing"

- "Strawberry Letter 23," Shuggie Otis (1971)
- "Isn't She Lovely," Stevie Wonder (1976)
- "Sound and Vision," David Bowie (1977)
- "You've Really Got a Hold On Me," The Miracles (1962)
- "Wanna Be Startin' Something," Michael Jackson (1983)
- "Helpless," CSN&Y (1970)
- "What A Man," Linda Lyndell (1968)

⁵² The enjoyment of the familiar is in some respects the enjoyment of met expectations.

- “Norwegian Wood (The Bird Has Flown),” The Beatles (1965)
- “I’ve Never Found A Girl (To Love Me Like You Do),” Eddie Floyd (1968)
- “Blue Jay Way,” The Beatles (1967)
- “Mature Themes,” Ariel Pink’s Haunted Graffiti (2012)
- “Never Can Say Goodbye,” The Jackson 5 (1971)
- “Don’t Stop,” Fleetwood Mac (1977)
- “Chamber of Reflections, Mac DeMarco (2014)

IV.iii. Melodic Imitation

In addition to Melodic Foreshadowing, many songs take advantage of the familiarity principle by repeating, or imitating, a vocal melody after the fact through another sound-source. This technique is called Melodic Imitation. In Jazz pedagogy, beginning improvisers are often instructed to riff on, or even repeat, the melody during their solo. This is an example of Melodic Imitation.

IV.iv. Songs that Utilize “Melodic Imitation”

- “Dancing in the Dark,” Bruce Springsteen (1984)⁵³
- “Killer Queen,” Queen (1974)⁵⁴

⁵³ Synth-line at 2:48 imitates vocal melody.

⁵⁴ Guitar solo imitates vocal melody.

IV.v. Visual Analogies of MFI

Repetition of melodic figures in songs is analogous to the concepts of *harmony* and *unity* in visual art. In visual art, *unity* refers the “quality of wholeness or oneness” and *harmony* is “the principle of art that creates unity by stressing the similarities of separate but related parts. Repeating similar melodies throughout different points within the soundbox gives the sound-box cohesion as a self-contained object. Similar continuities can be seen within *our* own spherical soundbox through similar repetitions of shape and form (Figure 3).

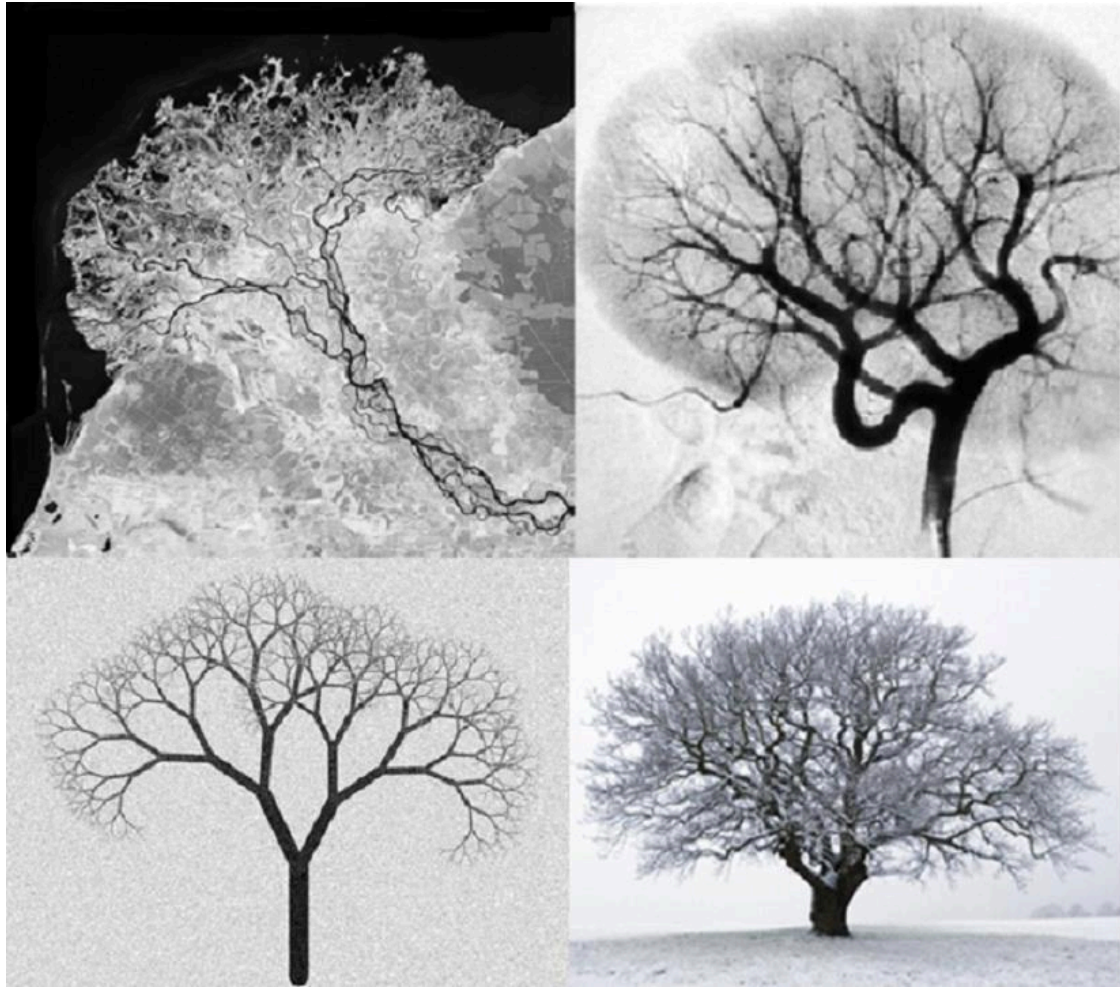


Figure 3. Clockwise from Topleft: Selenga River Delta, Human Kidney Angiogram, Fractal Image, Deciduous Tree In Winter⁵⁵

IV.vi. Ends Are Beginnings: Phrase ‘n’ Pastes

Like MFI, producers use a technique, Phrase ‘n’ Pastes (PnP), to make use of the familiarity principle. PnP is most common as an intro, and functions by taking the last beat or two of a groove and copy and pasting that section of the phrase as an intro.

⁵⁵ Imgur. <http://imgur.com/gallery/YC3KrnY>

This technique is often combined with other techniques such as instrumental accretion with degree of complexity and subtlety. Simpler examples of this technique include Todd Rundgren's "I Saw the Light" (Track 15) and Tame Impala's "The Less I Know the Better," (Track 16). Both songs use the end of their verse riffs as an introduction. More complex versions include Built To Spill's "Center of the Universe," (Track 17) which uses a three-note percussive rhythm identical in length to the rest that concludes the first cycle of the verse groove, and Outkast's "Hey Ya," (Track 18) which similarly uses a three-note count off that reflects the three snare hits that conclude each cycle of the verse groove. An even more complex example can be heard in Tame Impala's "Eventually," (Track 19).

IV.vii. PnP in "Eventually"

While the intro to "Eventually," may sound like a mess of noise, it is actually a highly calculated foreshadowing of the phrase structure in the following section. At 0:02, two, low percussive eight-notes are heard. At 0:05, a tremolo effect articulates four-sixteenth notes. These rhythms are respectively reflected in the guitar/bass hits that enter at 0:06 and that sixteenth-note hi-hat pattern that can be heard most explicitly between 0:07 and 0:09.

Chapter V: Conclusion

When we listen to music, we hear different things. Sometimes we even *see* things. Whether they be memories, lyrical images, or representations of musical notes, music is unique its ability to stir passion. This thesis presents a way of listening to music through the lens of seeing. Through identifying and defining several techniques of transition, an examination of the visual conceptual metaphors we use when we describe music through language, and an in-depth exploration of the parameters of the musical soundbox, this paper argues that many of music's functional elements can be understood visually in the same way that composition techniques, such as line and depth, function in visual art. I hope that the analysis presented in this thesis provides a new lens through which to listen to, think about, and decode musical meaning.

Wearing new glasses of understanding is important because every style of music functions relative to its own unique goals. A Funk song, for example, may have the goal of groove, of digging a pocket deeper and deeper through repetition. A Classical Sonata, on the other hand, may have a goal of journey, of starting at home, travelling far away, and eventually returning home. It would be ridiculous to say that Beethoven's "Sonata Pathétique" is inferior to Funk because it doesn't groove, in the same way it would be ridiculous to say Parliament's "P-Funk (Wants to Get Funked Up)" is inferior to Classical Sonatas because it doesn't go on a motivic there-and-back-again journey. In other words, if you are going to judge music, judge it on its own terms for what it is, not what it is not. Furthermore, by expanding the range of one's musical paradigm, one can begin to see that "Sonata Pathétique" *does* groove, and that "P-Funk (Wants to Get

Funked Up)” *does* go on a journey. They just do their things in their own respective ways.

To students of music, do your thing. Don’t be afraid to study what you love, and don’t be afraid to study what you don’t. When it comes to perspective, the more the merrier. To teachers of music, encourage your students to explore music from as many angles as possible. Life, like music, is best understood when seen from every angle. Lastly, to the players of music, I hope the topics discussed here present new canvasses on which to paint and express the gift of music.

Going forward, there are many ripe areas of study that we can approach through the “record-centric” analytical lens presented here. While my choice of examples was defined more by personal taste and interest than by historical or thematic consistency, it would be interesting to explore how these techniques change, evolve, and adapt over time. It would also be interesting to see how they are used differently, if at all, across diverse genres. All in all, the recorded form is a rich, beautiful form worthy of focused study... we just need to find a means of doing so, which for better or worse, means creating one.

Appendix A: Lyrics to “Our House”

I'll light the fire, you place the flowers in the vase that you bought today.
Staring at the fire for hours and hours while I listen to you
Play your love songs all night long for me, only for me.

Come to me now and rest your head for just five minutes, everything is good.
Such a cozy room,
The windows are illuminated by the evening sunshine through them,
Fiery gems for you, only for you.

(Refrain)

Our house is a very very, very fine house with two cats in the yard,
Life used to be so hard, now everything is easy 'cause of you

La, La, La

And...

(Refrain)

I'll light the fire, while you place the flowers in the vase that you bought today.

Appendix B: Lyrics to “Zen Archer”

Pretty bird with feathers falling
Pretty as a lady calling
For her pink and midnight lover
As she stares into the water
And a yellow moon is rising
And there can't be no disguising
That the pretty bird is dying
With a silver arrow lying at its side
Rivers of blood,
Oceans of tears,
Life without death,
And death without reason
To the whole United Nations,
To your greatest expectations
To the moment that you realize
As a dark figure slips from out of the shadow
Pretty bird closes its eyes, pretty bird dies
Another pretty thing dead on the end of the shaft
Of the Zen Archer
A man in parts forgotten
With an outlook that is rotten
And an attitude to match it
Finds relief inside a hatchet
And he halved someone in Boulder
Justifiability is in the hands of the beholder
And you just don't know what people will do next
Mountains of pain,
Valleys of love,
Death without life,
And life without meaning
To the promise kept and broken
To the love that's never spoken
Just as surely as I'm in your ears
A dark figure slips from out of the shadow

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